

# Rapid Assessment Surveys in Northeast National Estuaries:

Identifying Marine Bioinvaders in  
Fouling Communities

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Chair, TAC, Massachusetts Bays  
Program

# Some Definitions

- Human-mediated introductions
- Many vectors responsible for introductions
  - Intentional (aquaculture, agriculture, ornamentals, aquaria pets)
  - Unintentional (ballast water, shipping (fouling etc.), escapes, spillage, etc.)
- Introduced species – those that arrive from outside their native range
- Invasive species – those that create problems usually measured in human terms (however, all may impact ecosystems)
- Cryptogenic species – those whose origins are unknown.

# Presentation outline

- Describe a marine bioinvasion rapid assessment survey
- Present results
- Discuss management implications
- Identify NEP accomplishments and role
- Future directions: the whole is greater than the sum of the parts

# RAS 2000, 2003

- I identify non-native and native species in floating dock communities
- 12-15 taxonomic experts visited ~20 sites
- I identify species on the dock and in labs (live when possible)
- Archive voucher specimens
- Use information to support management actions to prevent, reduce, manage invasive species

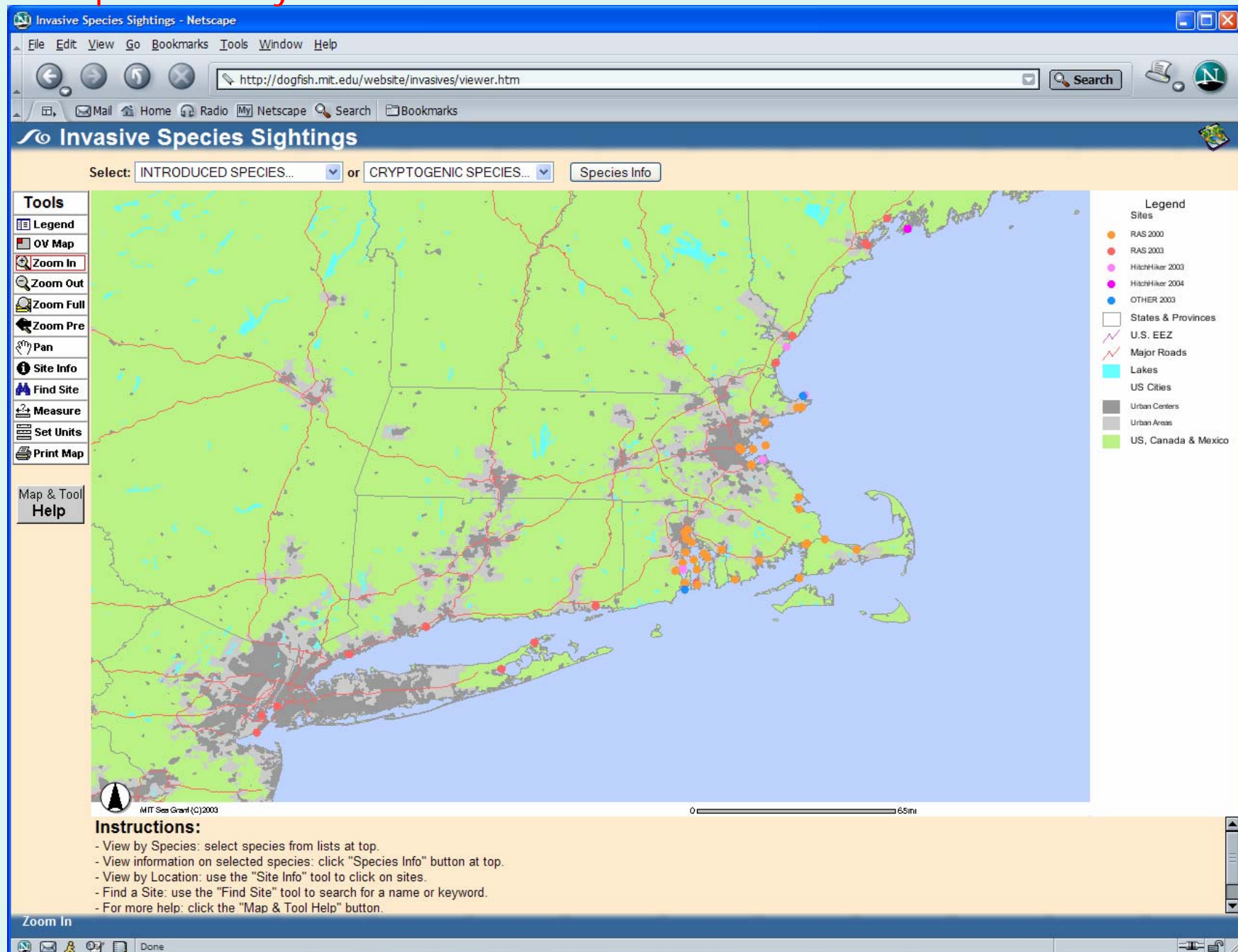
## Taxonomic expertise in RAS 2000 and/or 2003

- Robert Bullock, molluscs
- Dale Calder, hydroids
- James Carlton, ombudsman
- John Chapman, pericaridans
- Andrew Cohen, tanaeids, generalist
- Harlan Dean, polychaetes
- Nicole Dobroski, barnacles
- Peter Dyrinda, sponges, byozoans
- Ryan Fisher, polychaetes
- Larry Harris, sea slugs, generalist
- Niels Hobbs, pericaridans
- Gretchen and Charles Lambert, tunicates
- Eric Lazo-Wasem, pericaridans
- Arthur Mathieson, phycologist
- Maria Pia Miglietta, hydroids
- Judith Pederson, generalist
- Julian Smith, flatworms, nemerteans
- Seth Tyler, flatworms, nemerteans
- Megan Tyrrell, generalist, crustaceans
- Judith Winston, bryozoans

## National Estuary Programs

- Casco Bay
- Buzzards Bay
- Peconic Bay
- New Hampshire
- Narragansett Bay
- NY/NJ Harbor
- Massachusetts Bays
- Long Island Sound

<http://massbay.mit.edu>





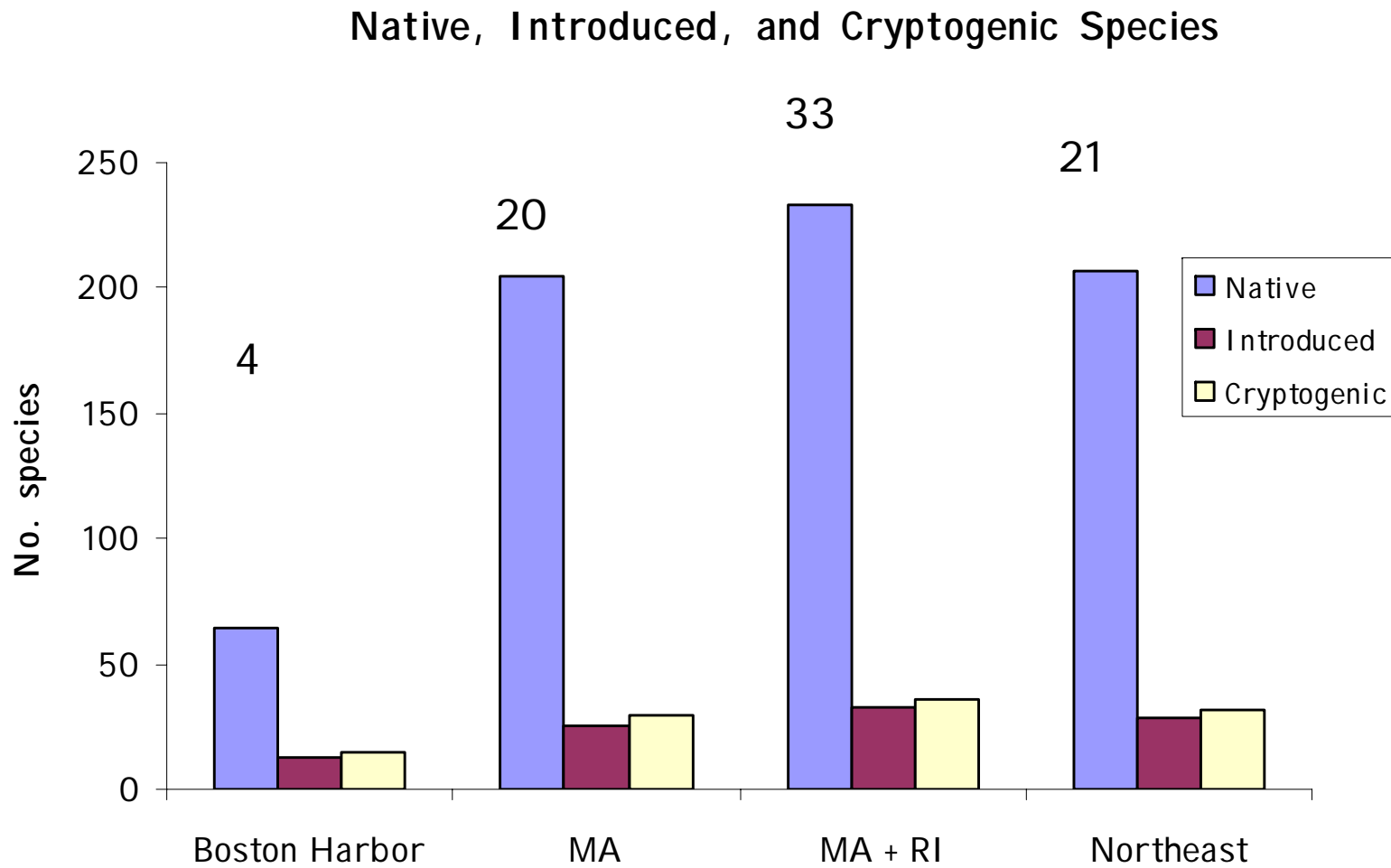
Team RAS 2000 in MA,  
J. Carlton and P.  
Drynda, 2003, UNH  
Laboratory

Photos: P. Drynda; G. Lambert





No. above area indicates sampling locations used in calculations





# Percent of total introduced and cryptogenic species; (no. sites)

Location	Introduced	Cryptogenic	Total
Boston H. (4)	<b>14%</b>	<b>16%</b>	<b>92</b>
Mass 2000 (21)	<b>10%</b>	<b>12%</b>	<b>260</b>
RI 2000 (13)	<b>13.5%</b>	<b>20%</b>	<b>148</b>
MA+RI (33)	<b>11%</b>	<b>12%</b>	<b>302</b>
MA 2003 (6)	<b>11%</b>	<b>10%</b>	<b>242</b>
Northeast (21)	<b>10%</b>	<b>12%</b>	<b>267</b>



Photo: A. Locke

*Styela clava* growing on mussel nets in Prince Edward Island.



The club or rough club tunicate (*Styela clava*) covered with other invasive species. Approximately 6 inches long.

Bryozoans, *Bugula neritina* (red)  
*Bugula simplex* (tan); star  
tunicate, *Botryllus schlosseri*,  
orange sheath, *Botrylloides*  
*violaceus*

Photo: R. Drynda





The lower right photo is from New Zealand, others, J. Carlton with *Didemnum* sp. (aff. *Lahillei*), subtidal population.

Photos: New Zealand newspaper; C. Lambert; B. Toppin



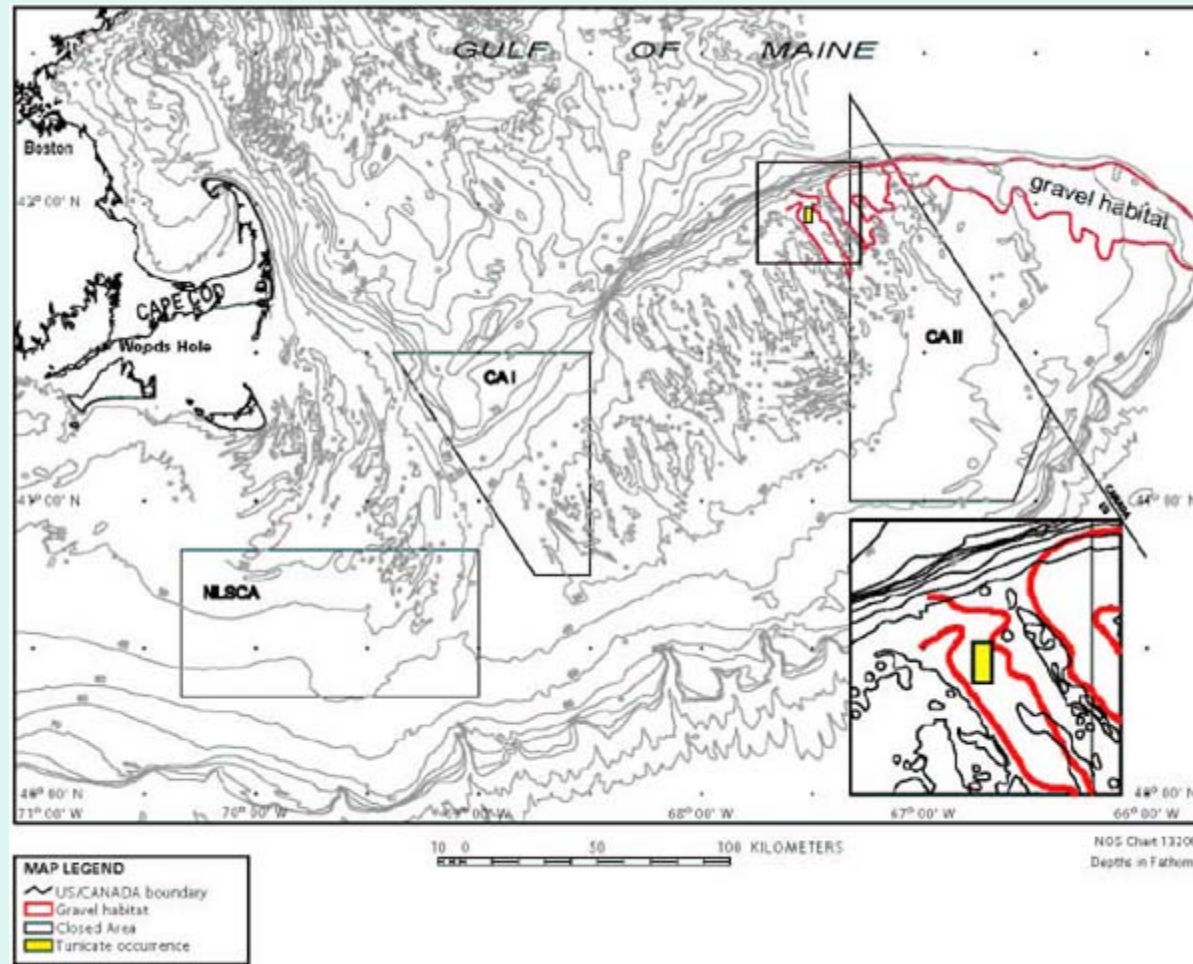
*Didemnum* sp., a compound tunicate from the Pacific that has been found in Georges Bank gravel beds that are prime scallop beds.



Photos: USGS, P. Valentine



Map showing area impacted by *Didemnum* sp., an invasive tunicate from the pacific



# Statistics and Communication of the scope of the problem

- **\$130 billion** spent annually in the U.S. for invasives in all ecosystems; poor documentation for marine environment
- **\$1 million/year** to extirpate 10% of *Spartina alterniflora* in CA, increases by 40%.
- **\$4.1** spent over 4 years to eradicate *Caulerpa taxifolia*, but still can be purchased in CA



# Future Directions

- Economic studies
- Ecological studies
- Communication and outreach
- Early detection
- Rapid response
- Regional ballast water management
- General management issues

# Acknowledgements

- US EPA funded RAS 2003
- 8 NEP programs
- Scientists, students, state agencies and others
- NOAA Sea Grant

Sea Grant programs (RI and MA), state agencies, and those who donated labs